ABSTRACT

[0068] Methods and systems for three-dimensional imaging through turbulence such as produced by the Earth's atmosphere are described. A first light source may direct an output of pulses to a target through atmospheric turbulence. A first image sensor, for example a time of arrival sensor or focal plane, may receive light from the first light source and may be used to record two-dimensional images or image slices of the target. A second light source may also be used. A second image sensor may receive light reflected from the target. An atmospheric point spread function may be derived or calculated by a means for multiframe blind deconvolution from one or more images of the target received at the second image sensor. The point spread function may be used to deblur or improve the resolution of each of the two-dimensional image slices from the first image sensor. The two-dimensional image slices may be combined to form a three-dimensional image of the target.